

Proposed claim amendments for
application No. 09/991,353 and discussion of US Patent No. 5,101,831
(Koyama et al.)

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DISCUSSION

Koyama et al. discloses monitoring the heart rate of the subject and periodically discriminating the sleep state of the subject from the pulse rate for a period of time after a start time (T_p) and prior to a desired wakeup time (T_w).

Koyama et al. method 1 (col. 8, lines 11-24)

Koyama et al.'s first method (shown in attached diagram) involves discriminating that the subject has terminated a REM sleep state in the time period between T_p and T_w and, upon such a discrimination, introducing a strong and weak stimulus. After the strong and weak stimulus are introduced, they may increased. However, after introduction, the strong and weak stimulus are not adjusted based on heart rate feedback.

Koyama et al. method 2 (col. 8, lines 25-46)

Koyama et al.'s second method (shown in attached diagram) involves introducing a weak stimulus at the time T_p and increasing the weak stimulus. After introduction, the weak stimulus is not adjusted based on heart rate feedback. When the system discriminates the subject's awakening period or T_w (whichever comes first), then a strong stimulus is introduced. After introduction, the strong stimulus is not adjusted based on heart rate feedback.

Koyama et al. after T_w (col. 8, lines 47-61)

Koyama et al. discloses continuing to monitor the subject's heart rate and periodically discriminating the sleep state of the subject from the pulse rate after the wakeup time T_w (see attached diagram). If the discrimination judges that the person is falling back asleep, then the strong stimulus is continually or intermittently actuated.

Proposed Claim Amendments

A major difference between the Applicant's invention and Koyama et al. is that the Applicant's invention involves periodic adjustment of the stimulus intensity during the period between the

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stimulus introduction time and the final wakeup time based on feedback which includes a difference between a current time and the final wakeup time. This feature is not disclosed by Koyama et al. Koyama et al. merely discloses introducing a weak stimulus based on a discrimination of a sleep state (in method 1 and 2) and introducing a stimulus at a predetermined time T_p (in method 2). This difference is reflected in the proposed claim 1.

Another difference (included as proposed dependent claim 2) is that the Applicant's invention involves periodic adjustment of the stimulus intensity based on feedback over the entire time period between the stimulus introduction time and the final wakeup time. In contrast, Koyama et al. describes monitoring the heart rate and periodically discriminating a sleep state, but only adjusts the stimulus intensity based on feedback at one or two discrete times between the time T_p and the time T_w .

A related difference (included as proposed dependent claim 3) is that the Applicant's invention involves periodic adjustments to the stimulus intensity based on feedback which are made at least three times during the period between the stimulus introduction time and the final wakeup time. Koyama et al. only discloses adjusting the stimulus intensity based on feedback at one or two discrete times between the time T_p and the time T_w .

Another difference (included as proposed dependent claim 4) is that the Applicant's invention involves feedback based control of a rate of change of the stimulus intensity over the period between the stimulus introduction time and the final wakeup time. Indeed, in accordance with the Applicant's invention, the rate of change of the stimulus intensity over time may be negative in the period between the stimulus introduction time and the final wakeup time (included as proposed dependent claim 5). Koyama et al. fails to teach or suggest controlling the rate of change of a stimulus intensity over time. Koyama et al. discloses that the stimulus intensity may increase over time, but this rate of increase is not controlled based on feedback, nor does Koyama et al. disclose that the stimulus intensity may decrease.

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1. (Currently Amended) An apparatus for waking an individual in a manner that promotes said individual's well being comprising:

at least one sensor operative to sense at least one parameter correlated to said individual's sleep level; and
a controller capable of being set by said individual with a final wakeup time, said controller connected to receive sensed values of the at least one parameter from the sensor and configured to introduce a stimulus at a stimulus introduction time prior to the final wakeup time and, over a period between the stimulus introduction time and the final wakeup time, to control adjust an intensity of the stimulus based on feedback which comprises the sensed values of the at least one parameter and based on a difference between a current time and the final wakeup time, so as to bring said individual gradually out of sleep and to an awake state over a period of time between the stimulus introduction time and the final wakeup time.

2. (New) An apparatus according to claim 1 wherein the controller is configured to periodically adjust the intensity of the stimulus throughout the period between the stimulus introduction time and the final wakeup time based on the feedback.

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3. (New) An apparatus according to claim 1 wherein the controller is configured to periodically adjust the intensity of the stimulus at least three times in the period between the stimulus introduction time and the final wakeup time based on the feedback.
4. (New) An apparatus according to claim 1 wherein the controller is configured to control a rate of change of intensity of the stimulus over time throughout the period between the stimulus introduction time and the final wakeup time based on the feedback.
5. (New) An apparatus according to claim 4 wherein the controller is configured to control the rate of change of intensity of the stimulus over time to be negative if the sensed values of the at least one parameter indicate that the user may reach the awake state prior to the final wakeup time.

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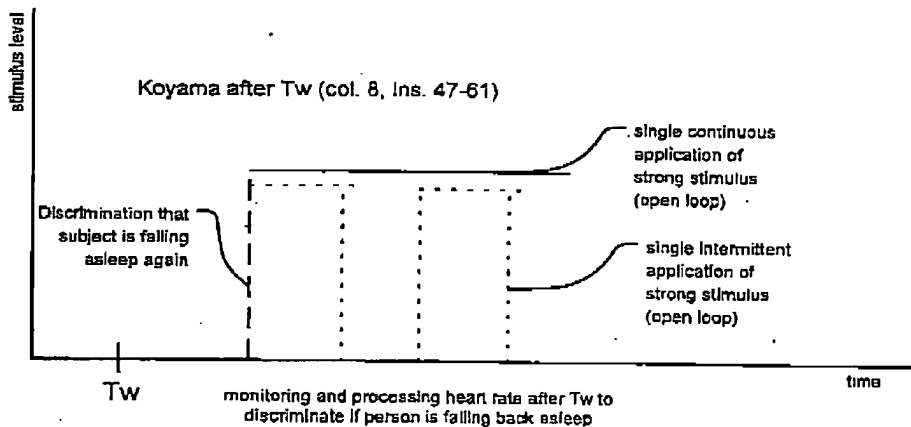
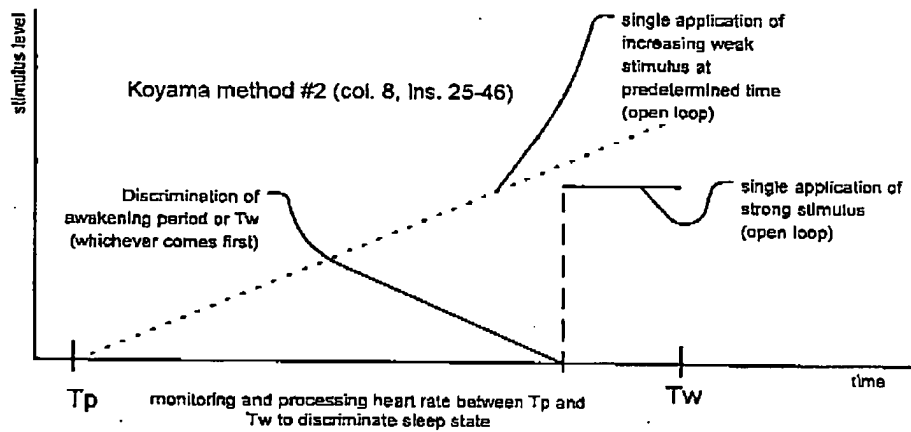
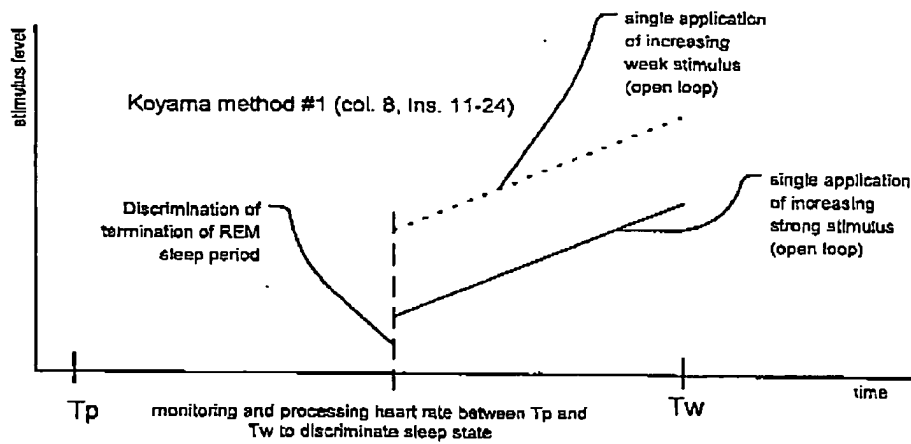


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